[0029] In some embodiments, the risk reduction is computed for each of the specified corrective actions **(Step 115)** without attempting to optimize the risk reductions associated with combinations of corrective actions. For example, the risk reduction may be calculated by changing one specific maintenance or process input variable for a series of silicon wafers over time, computing the resulting risk reduction for each wafer, and subsequently calculating the urgency metric.

[0030] In some embodiments, an optimizer may be used to compute a multiple corrective action solution during the risk reduction calculation process **(Step 115)**. The optimizer finds the best combination of corrective actions that includes a specified corrective action and that produces one or more process metrics that are as close as possible to one or more target process metrics **130** at the lowest overall cost. For each corrective action, risk reductions are calculated and the urgency metric is then computed from the sequential wafer risks associated with the multiple corrective action solution.

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[0031] Figure 2 illustrates in greater detail an embodiment of the method of the invention. Various process metrics such as maintenance data **205**, trace process data **210**, output data **215**, and odometry data **220** are collected over time. Maintenance data **205** may include, for example, the elapsed time since the last maintenance activity. The data is then transformed (according to one or more transformations **225**) into a common, merged record format **230** by averaging, filtering, or grouping individual statistics. Using the merged records **230**, a neural network may then be trained on the relationship between the maintenance and process data **205**, **210**, and **220** and process output metrics, thereby producing, for a set of input data, a set of predicted results **240**.

[0032] In some embodiments, urgencies associated with multiple variables may be considered concurrently. If a maintenance action becomes urgent, the urgencies of related manipulated variables may, in some cases, rise simultaneously. This pattern may occur across multiple recipes and may be visible for maintenance actions addressing process characteristics as diverse as leaks, failing sensors, time between cleans, and slow wear-out of parts. In some embodiments, the neural network may require the registration of at least one maintenance action of a particular kind in its past maintenance database in order to correctly identify the pattern as being associated with this kind of action.